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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/716,269	11/17/2003	Damion T. Searls	884.242US2	6473

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EXAMINER

DUONG, THO V

ART UNIT	PAPER NUMBER
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3744

MAIL DATE	DELIVERY MODE
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05/02/2007

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/716,269

Applicant(s)

SEARLS ET AL.

Examiner

Tho v. Duong

Art Unit

3744

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 22 February 2007.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-5 and 17-30 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-5, 17-25, 29 and 30 is/are rejected.
- 7) ☒ Claim(s) 26-28 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- ☒ Notice of References Cited (PTO-892)
- ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- ☐ Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date _____
- ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____
- ☐ Notice of Informal Patent Application
- ☐ Other: _____

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 2/22/07 has been entered.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1-2,4,5, and 17-20 are rejected under 35 U.S.C. 102(b) as being anticipated by Elwell (US 5,315,154). Elwell discloses (figures 1,7 and column 2, lines 61-65) an apparatus comprising an integrated circuit chip (14), which is known as an integrated circuit die (See US 6,395,991); a copper conductive structure having a cavity to encapsulate a phase change material (16); the cavity including a cavity surfaces, ramp structure (side walls of 18) slopping upward from a low area (bottom flat surface) located at a center of the cavity surface; a plurality of fins (12b) formed on the conductive structure; a flat surface (12a) having a foot print larger than the surface of the die; the die (14) thermally coupled to the flat surface of the conductive structure;

Art Unit: 3744

and a large number of particles (54) of any suitable shape intermixed with the phase change material so that it will enhance the cooling in the phase change material by either conduction or convection. Elwell discloses (figure 11-12) that the phase change material (16) is poured into the cavity through an upper hole or opening of (18). The conductive structure is sealed by closing with structure (12). The term “inject” has been defined as “to introduce into something forcefully” by Merriam Webster’s Collegiate Dictionary , 10th Edition. Therefore, pouring is considered to read as “injecting” since the examiner has to interpret the limitation as broadly as it reasonably allows. Regarding the limitation that a cavity surface or ramp structure being configured to enhance the convection current, Elwell discloses that the cavity surface or ramp structure extends vertically from the bottom surface to form a chamber, which gives room to any convection current occurs within the chamber. Therefore, the vertically ramp structure is capable of enhancing the formation of convection currents. (Without space or room, no convection current will exist).

Claims 24-25 are rejected under 35 U.S.C. 102(b) as being anticipated by Arrhenius (US 4,391,267). Arrhenius discloses (figures 2-3) a method comprising forming a heat sink including forming a pair of symmetrical structures (upper and lower structures) substantially identical to the other coupling together to form a cavity, each of the pair of symmetrical structures having a one-half volume; injecting a mixture including a phase change material and a number of particles (20) into the cavity; and sealing the cavity.

Claim Rejections - 35 USC § 103

Art Unit: 3744

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 3,21, and 23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Elwell in view of Salyer (US 5,370,814). Elwell discloses substantially all of applicant's claimed invention as discussed above except for the limitation that the phase change material is a TH58 and the particles have a density about equal to the density of the phase change material. Salyer discloses (figure 1 and column 2, lines 51-59) a mixture of phase change material and particles are contained in a cavity to use as a heat sink device wherein, the particles are silica particles (SiO_2) intermixed with a phase change material of salt hydrates to form a free flowing, conformable powder-like mixture of silica and phase change material to effectively absorb heat from a heat source and minimizing any possible leak since the mixture is rather dry when it is not heated. It would have been obvious to one having ordinary skill in the art at the time the invention was made to use Salyer's teaching in Elwell's device to form a free flowing, conformable powder-like mixture of silica and phase change material to effectively absorb heat from a heat source and minimizing any possible leak since the mixture is rather dry when it is not heated. As regards the limitation of TH58 and the density, Applicant discloses in the specification (page 7, lines 13-30), a few materials of phase change material such as paraffin, hydrated salts and particles such as SiO_2 or sand (silica) that can be used in the system and meet the requirement of TH58 and density. Therefore, Salyer's mixture of silica and salt hydrates is considered to read on the claims.

Claim 29 is rejected under 35 U.S.C. 103(a) as being unpatentable over Elwell in view of Hanrahan (US 5,945,217). Elwell substantially discloses all of applicant's claimed invention as discussed above except for the limitation that the particle has a spherical shape. Hanrahan discloses (figure 1 and column 5, lines 12-15) a cooling device that has a die (14) coupled to a conductive structure (10) that encapsulating intermixed particles, which have an aspect ratio 1:1 such as spherical shape to effectively dissipate heat from the die. It would have been obvious to one having ordinary skill in the art at the time the invention was made to use Hanrahan's teaching in Elwell's apparatus to effectively dissipate heat from the die. Since Elwell and Hanrahan are both from the same field of endeavor and/or analogous art, it would have been obvious to one having ordinary skill in the art at the time the invention was made to use Hanrahan's teaching in Elwell's apparatus for the purpose of effectively dissipating heat from the die.

Claim 22 is rejected under 35 U.S.C. 103(a) as being unpatentable over Elwell (US 5,315,154) and Salyer in claim 21 and further in view of Hanrahan (US 5,945,217). Elwell and Salyer substantially disclose all of applicant's claimed invention as discussed above except for the limitation that the particle has a spherical shape. Hanrahan discloses (figure 1 and column 5, lines 12-15) a cooling device that has a die (14) coupled to a conductive structure (10) that encapsulating intermixed particles, which have an aspect ratio 1:1 such as spherical shape to effectively dissipate heat from the die. It would have been obvious to one having ordinary skill in the art at the time the invention was made to use Hanrahan's teaching in Elwell's apparatus to effectively dissipate heat from the die. Since Elwell and Hanrahan are both from the same field of endeavor and/or analogous art, it would have been obvious to one having ordinary skill in the

Art Unit: 3744

art at the time the invention was made to use Hanrahan's teaching in Elwell's apparatus for the purpose of effectively dissipating heat from the die.

Claim 30 is rejected under 35 U.S.C. 103(a) as being unpatentable over Arrhenius in view of Hawe et al. (US 4,470,917). Arrhenius substantially discloses all of applicant's claimed invention as discussed above except for the limitation that the particle has a spherical shape. Hawe discloses (column 3, lines 29-39) a thermal storage composition that include particles having shape of a sphere for a purpose of obtaining particles having similar dimensions in each direction so that the heat transfer in the composition can be uniform. It would have been obvious to one having ordinary skill in the art at the time the invention was made to use Hawe's teaching in Arrhenius's device for a purpose of obtaining a particles having similar dimensions in each direction so that the heat transfer in the composition can be uniform.

Allowable Subject Matter

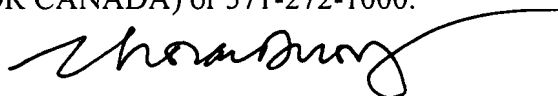
Claims 26-28 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Tho v. Duong whose telephone number is 571-272-4793. The examiner can normally be reached on M-F.

Art Unit: 3744

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Tyler J. Cheryl can be reached on 571-272-4834. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.



Tho v Duong
Primary Examiner
Art Unit 3744



TD
April 30, 2007